TRACER USER'S MANUAL

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*** TRACER USER'S MANUAL ***

SECTION 1 - INTRODUCTION

TRACER IS A MACHINE LANGUAGE UTILITY PROGRAM WHICH ENHANCES THE APPLE II'S BUILT-IN STEP/TRACE ROUTINES. IT PROVIDES THE USER WITH A MORE POWERFUL SOFTWARE TOOL TO HELP CHASE DOWN THOSE ELUSIVE PROGRAMMING BUGS.

THE APPLE II'S MONITOR IN ROM IS CRAMMED WITH MANY USEFUL ROUTINES. AMONG THESE IS A STEP/TRACE FEATURE WHICH ALLOWS USER CONTROL DURING THE EXECUTION OF HIS PROGRAM. THE STEP ROUTINE EXECUTES A SINGLE INSTRUCTION AND DISPLAYS ITS ADDRESS, BOTH HEX AND DISASSEMBLED CODE, THE VALUES OF THE A,X,Y,P REGISTERS AND THE STACK POINTER. THE USER HAS THE OPPORTUNITY TO MODIFY ANY REGISTER AND CONTINUE EXECUTION OF EITHER THE NEXT INSTRUCTION OR ANY ARBITRARY ONE.

UNFORTUNATELY, ALL THIS INFORMATION USES UP THE DISPLAY RATHER QUICKLY SUCH THAT AT BEST ONLY THE 11 MOST RECENT STEPS ARE SHOWN. IT SEEMED THAT IT WOULD BE USEFUL TO DISPLAY MORE PROGRAM COUNTER HISTORY AT THE EXPENSE OF OTHER INFORMATION.

SECTION 2 - WHAT IT DOES

THE TRACER PROGRAM WAS DESIGNED TO OPERATE IN CONJUNCTION WITH APPLE'S STEP/TRACE ROUTINES TO ENHANCE THEIR USEFULNESS. IT IS BASICALLY A FORMATTER WHICH CONTROLS THE INFORMATION OUTPUT TO THE SCREEN. THIS ROUTINE WILL DISPLAY UP TO 160 OF THE MOST RECENT INSTRUCTIONS EXECUTED. THIS IS IN ADDITION TO THE USUAL DETAILS (I.E. DISASSEMBLED CODE AND REGISTER DISPLAYS) OF THE LAST INSTRUCTION DISPLAYED.

FEATURES INCLUDE SINGLE STEP AND TRACE WITH PAGING. THE USER CAN EITHER CONTINUE EXECUTION OR TEMPORARILY EXIT TO MODIFY REGISTERS OR MEMORY.

TRACER ALSO LOOKS FOR THE BREAK CODE (00) AND WAITS FOR USER ACTION AFTER ANNOUNCING THE BREAK WITH A DOUBLE BELL. THE LAST INSTRUCTION EXECUTED BEFORE THE BREAK WAS ENCOUNTERED WILL STILL BE DISPLAYED.

CAUTION: IT SHOULD BE RECOGNIZED THAT TRACER'S DISPLAY LAGS BY ONE INSTRUCTION. IF THE MONITOR IS ENTERED VIA RESET, THE CURRENT REGISTER VALUES SAVED MAY BE DIFFERENT DUE TO THE NEXT INSTRUCTION HAVING EXECUTED. THUS THE USER SHOULD CHECK THEIR VALUES USING THE CONTROL-E MONITOR COMMAND.

SECTION 3 - HOW IT WORKS

TRACER CONTROLS WHAT INFORMATION IS DISPLAYED ON THE SCREEN BY MANIPULATING THE CHARACTERS GENERATED BY THE STEP/TRACE

ROUTINES. TRACER LOOKS FOR CERTAIN KEY CHARACTERS AND SEQUENCES TO DETERMINE WHEN ONE INSTRUCTION HAS BEEN COMPLETED.

TRACER LOOKS FOR THE CARRIAGE RETURN WHICH MARKS THE BEGINNING OF THE FIRST LINE BY DIVERTING ALL CHARACTERS TO TRACER VIA THE COUT HOOK. SUBSEQUENT CHARACTERS ARE STORED IN A BUFFER. THE SECOND LINE IS RECOGIZED BY A CARRIAGE RETURN FOLLOWED BY A SPACE ($A0). THE NEXT CARRIAGE RETURN IS USED TO OUTPUT THE 4 CHARACTER HEX ADDRESS FROM THE BUFFER (PLUS A SPACE) TO THE SCREEN USING THE MONITOR COUT ROUTINES ($FDF0). THESE ROUTINES TAKE CARE OF WRAPAROUND AND SCROLLING TO DISPLAY UP TO 160 ADDRESSES IN AN 8 BY 20 LINE FORMAT.

SINCE THE BUFFER HAPPENS TO BE PART OF SCREEN MEMORY THEN IT TOO IS DISPLAYED. THE BUFFER REGION IS PROTECTED BY MOVING THE BOTTOM OF THE SCROLLING WINDOW.

THE CONTROL Y FUNCTION IS USED TO INITIALIZE TRACER VIA A JUMP AT $3F8. IT CLEARS THE SCREEN, SETS THE SCROLLING WINDOW AND SETS THE COUT HOOK AT $36 AND $37 TO DIVERT ALL CHARACTERS NORMALLY DISPLAYED ON THE SCREEN TO TRACER.

SECTION 4 - USING TRACER

TRACER IS RELATIVELY SIMPLE TO USE:

1. BLOAD TRACER AND SET THE CONTROL Y JUMP TO $300 (I.E. 3F8:4C 00 03).

2. RUN THE PROGRAM VIA THE MONITOR BY TYPING: Y(C) XXXX T
   WHERE Y(C) IS A CONTROL Y AND XXXX IS THE ADDRESS WHERE DEBUGGING IS TO BEGIN. THE SCREEN WILL CLEAR, TRACER WILL BECOME HOOKED VIA COUT AND TRACING BEGINS AS THE SPECIFIED ADDRESS.

3. TRACER IS INITIALIZED TO SINGLE STEP AND WILL HALT AFTER DISPLAYING THE FAMILIAR STEP/TRACE INFORMATION AT THE BOTTOM OF THE SCREEN. ADDITIONAL STEPS ARE EXECUTED BY DEPRESSING THE SPACE BAR. THE ADDRESSES OF PREVIOUSLY EXECUTED INSTRUCTIONS WILL BEGIN TO ACCUMULATE IN THE UPPER PART OF THE DISPLAY.

4. ONE PAGE (I.E. 160) OF INSTRUCTIONS CAN BE EXECUTED BY DEPRESSING THE RETURN KEY INSTEAD OF THE SPACE BAR. CONTROL CAN BE RETAINED IMMEDIATELY BY HITTING ANY KEY.

5. OF COURSE HITTING RESET RETURNS THE USER BACK TO TNE MONITOR WHERE REGISTERS AND MEMORY CAN BE MANIPULATED IF NEEDED. TRACER CAN BE REENTERED BY TYPING: Y(C) T